产品规格书

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中航锂电（洛阳）有限公司

China Aviation Lithium Battery（LUOYANG）Co.,Ltd

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修 订 履 历

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1.适用范围 Scope

本产品规格书描述了中航锂电（洛阳）有限公司（以下简称中航锂电）生产的可充电锂离子电池的产品性能指标及技术要求。

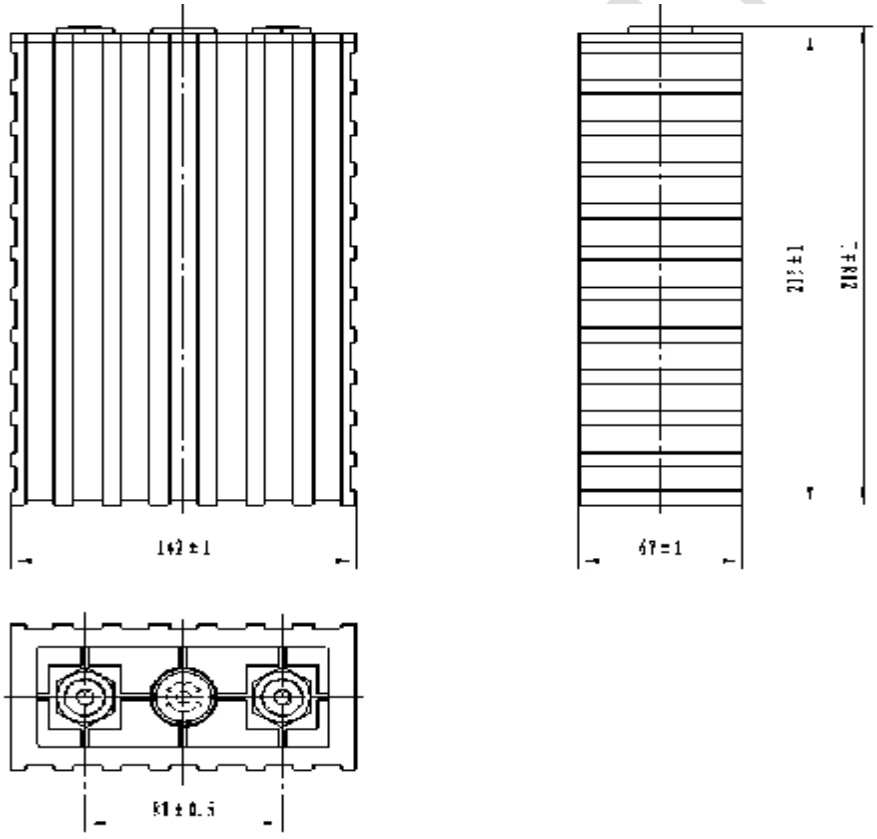
This purpose of this documents is to specify a 100Ah Lithium Iron Phosphate energy cell which manufactured by China Aviation Lithium Battery (Luoyang) Co., Ltd short for CALB by the following statement.

2.产品类型 Production

2.1 产品名称 Production Name ：磷酸铁锂动力电池 Lithium Iron Phosphate energy cell

2.2 型号规格 Model ： SE100AHA

3.单体电池尺寸 Dimensioned Drawing ：



项目 Item	描述 Description	尺寸 Dimensions
L	长度 Length	142mm ±1mm
W	宽度 Width	67mm±1mm
H	高度 Height	218mm±1mm

4.标称技术参数 Nominal Specifications

序号 S/N:	项目 Item		参数说明 Electrical Specification	备注 Remark
1.	标称容量 Nominal Capacity		100Ah@ 0.3C放电 100Ah@0.3C Discharge	
2.	最小容量 Minimal Capacity		100Ah@ 0.3C 放电 100Ah@ 0.3C Discharge	
3.	标称电压 Nominal Voltage		3.2 V	
4.	内阻 Internal Impedance		≤0.9mΩ	
5.	充电（恒流恒压 CC-CV） Charging (Constant Current Constant Voltage, CC-CV)	最大充电电流 Maximum charge current	1C	
		充电上限电压 Maximum charge voltage	3.6V	
6.	放电 Discharge	最大放电电流 Maximum Pulse Discharge Current	2C（30S）	
		放电终止电压 Minimum discharge voltage	2.5V	
7.	充电时间 Charging time Standard charge	标准充电 Standard charge	4h	参考值 Reference Value
		快速充电 Rapid charge	1h	

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8.	推荐 SOC 使用窗口 Recommend SOC window	SOC ： 10%~90%		
9.	工作温度 The ambient operating temperature range	充电 charge	0°C ~ 45°C	
		放电 Discharge	-20°C ~ 55°C	
10.	贮存温度 The long term ambient storage temperature	短期（1 个月内）Within one Month	-20°C ~ 45°C	
		长期（1 年内）Within one year	-20°C ~ 20°C	
11.	储存湿度 The storage humidity		＜70%	
12.	电池重量 Cell weight Approx		约3.2kg Approx. 3.2kg	
13	壳体材料 Case Material		塑料 Plastic	

5.测试条件 Standard environmental test condition:

5.1 测试环境条件 Test Circumstance

本规格书中各项试验应在标准大气条件下进行。

All of the test within the documents should be conducted under standard atmospheric pressure.

温度 temperature: 25±5°C

相对湿度 humidity: 45%~85%

大气压力 atmospheric pressure: 86KPa~106KPa

5.2 测量仪表与设备要求 Demand for measuring instruments and facilities

检验测试的所有仪表、设备（包括监控和监视试验参数的试验设备和仪器）应按国家有关计量检定规程或有关

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标准经检定或计量合格，并在有效期内。所有测试仪表、设备应具有足够的精度和稳定度，其精度应高于被测指标精度一个数量级或误差小于被测参数允许误差的三分之一。

All of the measuring instruments and facilities (include equipments which monitoring the test parameters) should be calibrated and inspected by Chinese regulation to be qualified and within expiration date. Adequate precision and stability of the measuring instruments and facilities is required which should be a higher lever than tested parameters or the test tolerance should be less than the allowed tolerance of the parameters.

5.3 标准充电 Standard charge

在环境温度（25±5）℃ 的条件下，对电池以 0.3C 恒流充电至充电限制电压后再恒压充电，直至电流小于 0.01C。

CCCV, constant current charge with a current equal to 0.3C to maximum charging voltage followed by a constant voltage charging process until the current fall to below 0.01C, to be performed at （25±5）℃.

5.4 标准放电 Standard discharge

在环境温度（25±5）℃ 的条件下，对电池以 0.3C 恒流放电至终止电压。

Constant current discharge the cell by 0.3C to minimum discharge voltage, to be performed at （25±5）℃.

6.电池性能 Battery performance

6.1 电性能 Electrical characteristics

序号 No.	项目 Item	技术要求 Requirements	测试方法 Test Method
1	外观 Integrity	电池应无破损、漏液、油污等缺陷，标识清楚。 There shall be no scratches, flaws, cracks, and leakages. Clear marking	目视 Visual Inspection
2	常温放电性能 Normal temperature Discharging Characteristics	放电容量/标称容量×100% Discharge Capacity/Nominal Capacity ×100% A）0.3CA ≥100% B）0.5CA ≥98% C）1CA ≥95% D）2CA ≥85%	电池标准充电后，搁置 1h，分别以 0.3C(A)、0.5C(A)、1C(A)、2C(A)进行放电至下限电压 2.5V，如果放电容量达不到额定容量，此项试验允许重复 3 次。 Cells to be standard charged, and then rested 10 mins before discharge to 2.5V at 0.3C, 0.5C, 1C. This test could be repeated for 3 times if the discharge capacity cannot reach the specified value.

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3	不同温度下的放电性能 Thermal Performance	放电容量/标称容量×100% Discharge Capacity/Nominal Capacity ×100% A) 55℃时≥95%（放电终止电压：2.5V） B) 0℃时≥90%（放电终止电压：2.5V） C) -10℃时≥80%（放电终止电压：2.0V） D) -20℃时≥70%（放电终止电压：2.0V） 放电终止电压:Minimum Discharge Voltage	测量电池的初始容量和初始状态，电池标准充电后，在 55±2℃条件下恒温搁置 3h、以 0.3C(A)放电至终止电压，然后在室温条件下标准充电。依次按照-10±2 ℃/-20±2 ℃的顺序在相应的恒温条件下搁置 20h，以 0.3C(A)测量电池对应的终止容量。 Cells initial status measured after standard charging. Cell then stored at 55±2℃ for 3 hours prior to discharge test. Discharge to minimum discharge voltage at 0.3C, and then standard charge the cell at nominal temperature. Stand still for 20 hours by the sequence of 0±2 ℃/-10±2 ℃/-20±2 ℃ and measure the capacity by discharging the cell at 0.3C
4	常温荷电保持能力 Energy Retain Capability	剩余容量≥标称容量*95% 恢复容量≥标称容量*97% Residual Capacity ≥ Nominal Capacity * 95% Recoverable Capacity≥ Nominal Capacity * 97%	测量电池的初始状态和初始容量，电池标准充电后，开路放置 30 天，测量电池最终状态；以 0.3C(A)放电至终止电压，计算电池的剩余容量；荷电保持能力可表达为额定容量的百分数。此电池标准充电后，搁置 30min 后，在（25±5）℃ 环境下，以 0.3C 放电池至终止电压。计算放电容量（以 Ah 计）。容量恢复能力可表达为额定容量的百分数。 Cells initial status measured after standard charging. Cell then rest for 30 days to measure the final status. Calculate the residual capacity by 0.3C (A) discharge the cell to minimum discharge voltage. Energy Retain Capability expressed as an Percent of nominal capacity. After the standard charging process, the cell should rest for 30 mins and 0.3C discharge the cell at ambient temperature（25±5）°C. Calculate the discharge capacity. The recoverable capacity expressed as an Percent of nominal capacity.
5	循环寿命 Life Cycle	≥1000 次 ≥1000 cycles	标准充电结束后，搁置 30min 后，在（25±5）℃ 环境下，以 0.3C 恒流放电至终止电压后，再进行下一个循环，至容量衰减为初始容量的 70%止，所完成的循环次数定义为该电池的循环寿命。 Rest for 30 mins after standard charge process, 0.3Cdischarge to minimum discharge voltage at （25±5）°C, and then conduct the next cycle until the

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			discharge capacity decrease to 70% of nominal capacity. Define all of the cycles within this process as the life cycle of the cell.
6	初始内阻 Initial Internal Impedance	半充状态下，测量其 AC 1 KHz 下的交流阻抗 In the state of half charge, measure the AC-impedance at AC, 1KHz.	≤0.9mΩ

6.2 安全性能 Safety Performance

序号 No.	项目 Item	技术要求 Requirements	测试方法 Test Method
1	过充电性能 Overcharge	不爆炸、不起火 Cell shall have no explosion or catch fire	电池标准充电后，在 20℃±5℃条件下搁置 1h。然后在同一温度下，以 1C(A)电流充电至 5V。 Cell shall be rest for 1 hour after standard charging, and 1C(A) charge the cell to 5 V at the same temperature.
2	过放电性能 Over discharge	不爆炸、不起火 Cell shall have no explosion or catch fire	电池标准充电后，在 20℃±5℃条件下搁置 1h。然后在同一温度下，以 0.3C(A)进行放电至 0V。 Cell shall rest for 1 hour after standard charging, and 1C(A) discharge to 0 V at the same temperature.
3	常温短路性能 Short Circuit at Room Temperature	不爆炸、不起火 Cell shall have no explosion or catch fire	电池标准充电后，在 20℃±5℃条件下搁置 1h。然后将蓄电池经外部短路 10min，外部线路电阻应小于 10mΩ。 Cell shall rest for 1 hour after standard charging, An impedance of less than 10 mΩ shall be applied across a fully charged cell.
4	针刺 Nail Penetration	不爆炸、不起火 Cell shall have no explosion or catch fire	电池标准充电后，在 20℃±5℃条件下搁置 1h。然后用φ3mm～φ8mm 的钢钉从垂直于蓄电池极板的方向迅速贯穿（钢针停留在蓄电池中）。 Cell shall rest for 1 hour after standard charging. Use a minimum of φ3mm～φ8mm steel spike with suitable force to penetrate the cell perpendicular to the large surface.

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5	挤压 Crush Test	不爆炸、不起火 Cell shall have no explosion or catch fire	电池标准充电后，在 20℃±5℃条件下搁置 1h。然后按下列条件进行试验： Cell shall rest for 1 hour after standard charging, and conduct the experiment by the following conditions: a) 挤压方向：垂直于蓄电池极板方向施压。Crush Direction: perpendicular to pole plate. b) 挤压程度：直至蓄电池壳体破裂或内部短路（蓄电池电压变为 0V）为止。Crush Extent: Until the case failure or internal short-circuit(the voltage of the cell change to 0 V)
6	跌落性能 Drop	不爆炸、不起火 Cell shall have no explosion or catch fire	电池标准充电后，在 20℃±5℃条件下搁置 1h，然后自 1.5 米高处跌落至木地板上。要求每个面跌落 2 次。 Cell shall rest for 1 hour after standard charging, and to be dropped from a height of 1.5 m onto a wooden floor. The drop is to be repeated 2 times on each surface.

7.运输 Transportation

电池应在半荷电状态（约标称容量值的 60%电量）下包装成箱进行运输，在运输过程中应防止剧烈振动、冲击或挤压、防止日晒雨淋，适用于汽车、火车、轮船、飞机等交通工具运输。

Cell shall be half charged (Approximately 60% of nominal voltage) and packaged for transportation. Intensively vibration, impact or exposed to the sun and rain shall be avoided. Battery package could be delivered by motor, train, vessel and air plane, etc.

8.贮存及其它事项 Storage and Others

8.1 长期贮存 Long term storage

电池应贮存（超过 1 个月）在环境温度为-20℃~45℃的清洁、干燥通风的室内，应避免与腐蚀性物质接触，应远离火源及热源。每 6 个月对电池进行一次充放电，储存电压为 3.2～3.35V。

If the cell is to be stored for a long time (exceed 1 month), the cell should be stored in dry and cool environment at ambient temperature of -20℃~45℃ and should be isolated from corrosive substance, combustion source and heat source, keep charge and discharge the cell for every six month, storage voltage is 3.2～3.35V.

8.2 其它事项 Others

任何本规格书中未提及的事项，须经双方协商确定。

Any matters that this specification does not cover should be confirmed between both parties.

9. 电池使用时操作指示及注意事项 Operating Instruction and Cautions

9.1 充电 Charging

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9.1.1 充电电流 Charging Current

充电电流不得超过本标准书中规定的最大充电电流。使用高于推荐值电流充电将可能引起电池的充放电性能、机械性能和安全性能的问题，并可能会导致发热或漏液。

Charging current is shall not exceed the stipulated maximum current. Charging the cell with the current which exceed the recommend current may cause the issues of electrical performance, mechanical performance and safety and may cause electrolyte leakage and fever.

9.1.2 充电电压 Charging Voltage

充电电压不得超过本标准书中规定的最大上限电压。电池电压高于最大上限电压值时，将可能引起电池的充放电性能、机械性能和安全性能的问题，并可能会导致发热或漏液。

Charging voltage shall not exceed the stipulated maximum voltage. If the cell voltage exceed maximum charge voltage may cause the issues of electrical performance, mechanical performance and safety and may cause electrolyte leakage and fever.

9.1.3 充电温度 Charging Temperature

电池必须在 0℃~45℃的环境温度范围内进行充电。

Cell needs to be charged at the thermal range of 0℃~45℃.

9.1.4 禁止反向充电 Reverse Charge is forbidden

正确连接电池的正负极，严禁反向充电。若电池正负极接反，将导致电池报废并产生安全隐患。

Correctly connected the positive and negative terminals, no reverse charge. If reverse connected the terminals may cause the cell scrap and safety issues.

9.2 放电 Discharging

9.2.1 放电电流 Discharge Current

放电电流不得超过本标准书书规定的最大放电电流，大电流放电会导致电池容量剧减并导致过热。

Discharge current shall not exceed the stipulated maximum discharging current, Large current discharge would cause rapid decrease of the capacity and overheat.

9.2.2 放电温度 Discharging Temperature

电池必须在-20℃~55℃的环境温度范围内进行放电。

Cells must be discharged at the ambient of -20℃~55℃.

9.2.3 禁止过放电 Overcharge-discharge prohibition

在电池正常使用过程中，应安装电池管理系统防止电池过放电的发生，若电池过放电，将导致电池报废并产生安全隐患。

Battery Management System should be set up during regular using process to prevent over discharge. Over discharge may cause the safety issues.

需要注意的是，在电池长期未使用期间，它可能会由于其自放电特性而处于某种过放电状态。为防止过放电的发生，电池应定期充电，将电压维持在 3.2V 以上。

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Attention, during the long-term storage period, it may experienced over discharge statue based on its own characteristics. Frequently charging the cell is necessary to maintain the voltage above 3.2V.

9.3 电池操作注意事项 Operation Cautions

9.3.1 使用电池前，请仔细阅读使用说明书和注意电池表面标识。

Please read the instruction and recognize the terminal identification before using the batteries.

9.3.2 请在正常的室内环境中使用电池，温度：-20℃~55℃，相对湿度：65±20%。

Please use the batteries within room temperature, ambient temperature -20℃~55℃, humidity 65±20%.

9.3.3 在使用过程中，应远离热源、火源，避免儿童玩弄电池，切勿摔打电池，禁止坠落、冲击电池。

Keep the cells far away from heat source, combustion source. Avoid children play with the cell, strike, drop, crush the cell.

9.3.4 本电池只能使用配套的充电器充电。

Only use the configured charger charging the cells.

9.3.5 任何时候禁止短路电池，它会导致电池严重损坏，以免发生危险。

Short-circuit the cell is forbidden for any time which may cause serious damage and safety issues.

9.3.6 长期不用时，请将电池贮存好，让电池处于半荷电状态，既不充满，也不放完。

Please keep the cell under half charge statue, neither fully charge or discharge if long term storage.

9.3.7 废弃电池请安全妥当处理，不要投入火中或水中。

Please properly treat the waste cell, do not through into fire or water.

9.3.8 电池箱设计注意事项 Caution for the design of the battery compartment.

- 电池箱应有足够的机械强度以保证其内部电池免受机械撞击
  The battery compartment need to hold adequate mechanical strength to prevent the internal cells of any impact.
- 箱内安装电池的部位不应有锋利的边角
  Sharp edge shall not be close to the cell installation position.
- 需增加空气对流、防水防尘等措施
  Cross-ventilation and waterproof and draft free.

9.3.9 电池的连接 Connection of the cells

- 使用前应用细砂纸打磨，否则可能会导致接触不良功能失效
  Terminals should be polishing before using
- 建议使用铜连接片来连接电池
  Copper busbar is recommend as the connection tools
- 采用专用扳手等工具进行连接操作
  Operate connection with special wrenches

9.3.10 维护保养请参见《中航锂电锂离子动力电池安装维护说明》
Please read the 《CALB lithium-ion battery installation, using and maintenance manual》as the reference.

10. 电池使用时警告事项及注意事项 Warning and Cautions for cell

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为防止电池可能发生泄漏、发热、爆炸，请注意以下预防措施：

To prevent possible safety issues, leakage, overheat, explosion, please observe the following the precautions:

警　　告 ！ WARNINGS!

- 严禁将电池浸入水中，保存不用时，应放置于阴凉干燥的环境中.
  Do not immerse the cell in water and should storage in dry and cool conditions.
- 禁止将电池在热高温源旁，如火、加热器等使用和留置.
  Do not use or leave the cell close to a heat source such as fire or heater.
- 充电时请选用锂离子电池专用充电器.
  Only use the supplied battery charger for the purposes of recharging the specific battery.
- 严禁颠倒正负极使用电池.
  Do not reverse the connections to the positive and negative terminals.
- 禁止将电池丢于火或加热器中.
  Do not dispose of the cell in a fire.
- 禁止用金属直接连接电池正负极短路.
  Do not short-circuit the cell by directly connecting the positive and negative terminals with metal objects.
- 禁止将电池与金属，如发夹、项链等一起运输或贮存.
  Do not transport or store the cell with metal objects such as hairpins, necklaces,etc.
- 禁止敲击或抛掷、踩踏和弯折电池等.
  Do not strike, crush, drop or throw the cell.
- 禁止直接焊接电池和用钉子或其它利器刺穿电池.
  Do not puncture the cell case with nails or other sharp objects.

小　　心 ！ CAUTIONS!

- 禁止在高温下（炙热的阳光下或天气很热的汽车中）使用或放置电池，否则可能会引起电池过热或功能失效、寿命减短
  Do not use or expose the cell to high temperature (for example, in strong direct sunlight or in a vehicle in extremely hot weather) This may result in the cell overheating, venting and /or its performance degenerate and its service life decreased.
- 禁止在强静电和强磁场的地方使用,否则易破坏电池安全保护装置，带来不安全的隐患
  Do not use the cell in a location where static electricity and magnetic field is great, otherwise the safety devices may be damaged, causing subsequent safety issues.
- 如果电池发生泄露，电解液进入眼睛，请不要揉擦，应用清水冲洗眼睛，并立即送医治疗，否则会伤害眼睛.
  In the event of a case rupture with leakage of electrolyte, if electrolyte gets into the eyes, do not rub the eyes, instead, rinse the eyes with clean water, and immediately seek medical attention.
- 如果电池发出异味、发热、变色、变形或使用、贮存、充电过程中出现任何异常，立即将电池从装置或充电器中移离并停用
  Cells need to be pull out from devices or chargers immediately if there is any peculiar smell, overheat, deformation, color change or any abnormal conditions.

电池安全试验参考 QC/T 743-2006《电动汽车用锂离子蓄电池标准》

Battery Safety Test Reference QC/T 743-2006 《Lithium-ion battery standard for electric vehicle》

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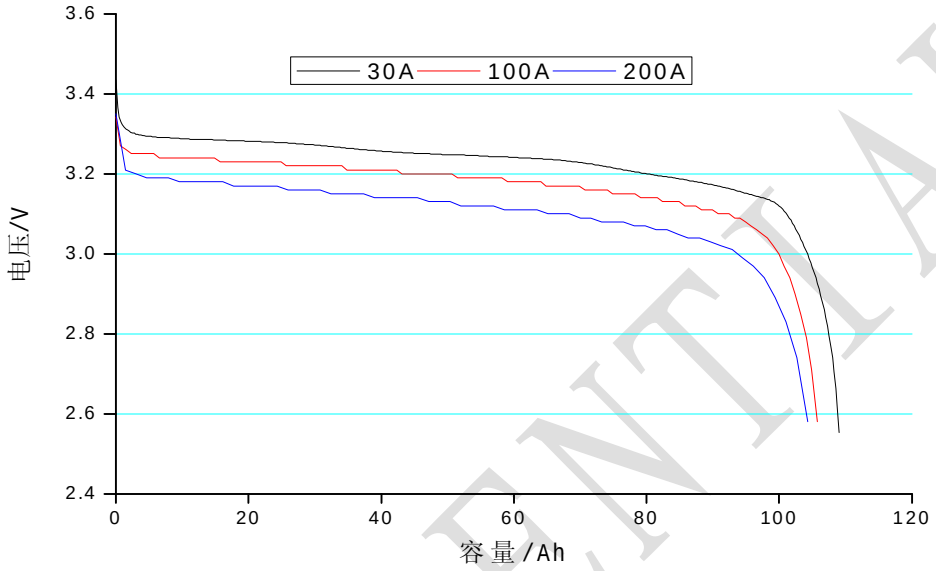
附录：电池产品电性能曲线图

Annex: Single Cell Electrical Performance Curve.



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